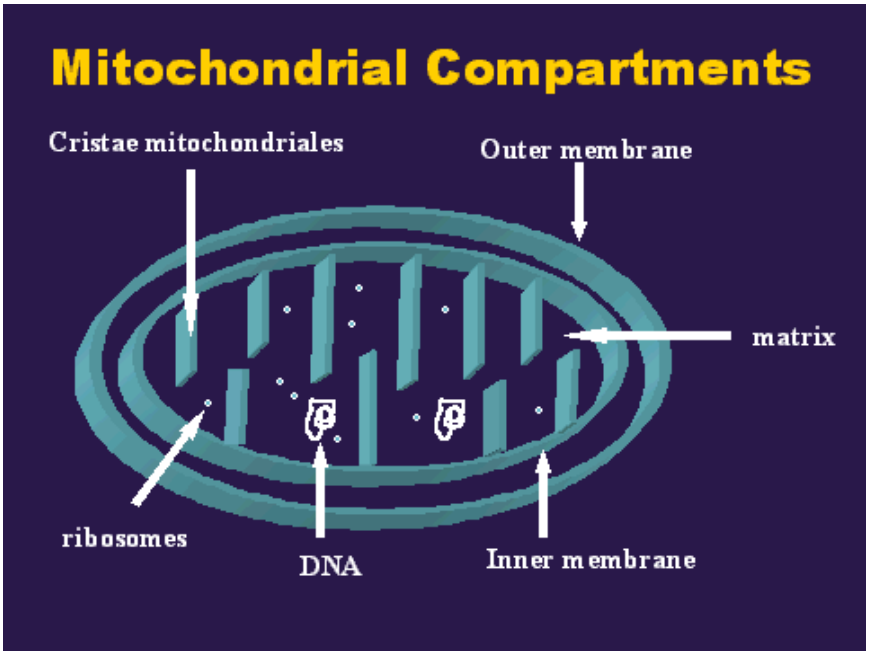
**Mitochondrial structure and Function**

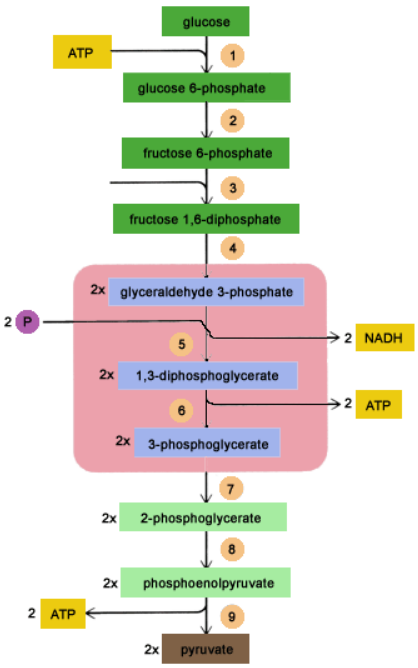



Mitochondria contain two membranes, separated by a space. Both are the typical "unit membrane"

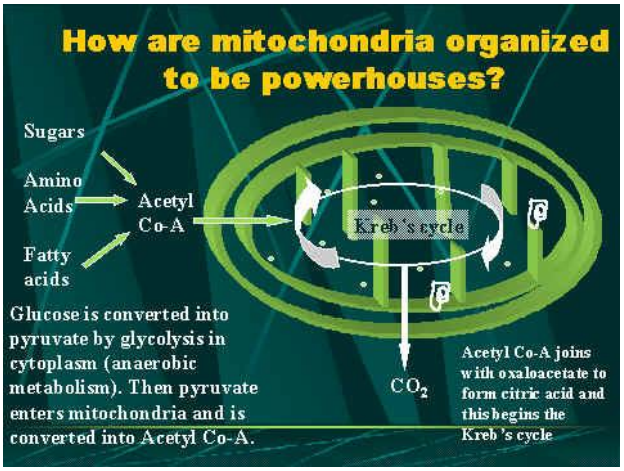
**How are mitochondria organized to be powerhouses? How do they Work**

The food we eat is oxidized to produce high-energy electrons that are converted to stored energy. This energy is stored in high energy phosphate bonds in a molecule called adenosine triphosphate, or ATP. ATP is converted from adenosine diphosphate by adding the phosphate group with the high-energy bond. Various reactions in the cell can either use energy (whereby the ATP is converted back to ADP, releasing the high energy bond) or produce it (whereby the ATP is produced from ADP).

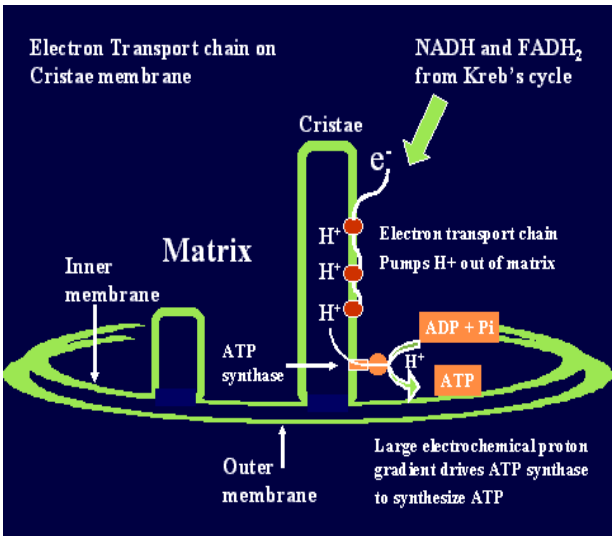
Once inside the cell, glucose is broken down to make ATP in two pathways. The first pathway requires no oxygen and is called **anaerobic metabolism**. This pathway is called **glycolysis** and it occurs in the **cytoplasm outside the mitochondria**. During glycolysis, glucose is broken down into pyruvate. Other foods like fats can also be broken down for use as fuel. Each reaction is designed to produce some hydrogen ions (electrons) that can be used to make energy packets (ATP). However, only 4 ATP molecules can be made by one molecule of glucose run through this pathway.



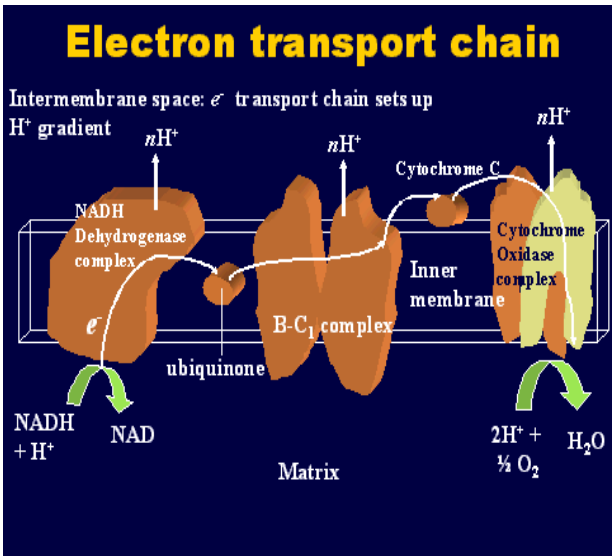

That is why mitochondria and oxygen are so important. We need to continue the breakdown process with the Kreb's cycle inside the mitochondria in order to get enough ATP to run all the cell functions.

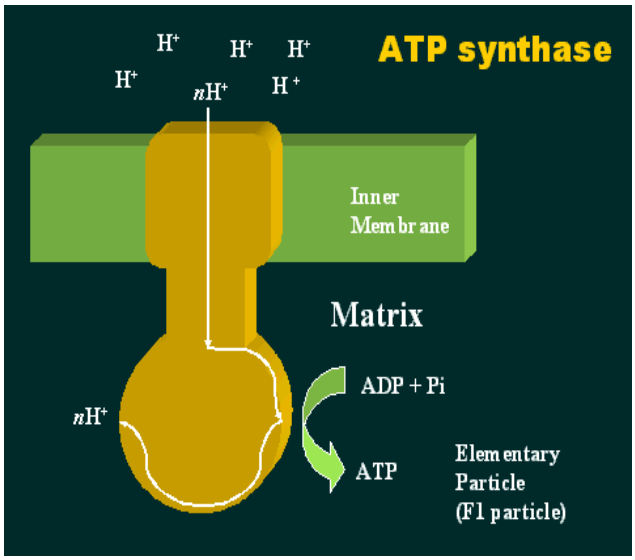



As the Kreb's cycle runs, hydrogen ions (or electrons) are donated to the two carrier molecules.




The molecules pass electrons to proteins in the Cristae membranes and as the electrons move from one protein to another H ions are pumped from one side to another to create A H ion Gradient.




The Hydrogen ion gradient is then used to make ATP. Without the Kreb cycle very little ATP is produced. The inner layer of the membrane allows the H ion concentration to be located near the ATP synthase. The Cristae is wrinkled to allow more surface area for the electron transfer chain and therefore more H ion pumped.